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Comparison of Lip Prints, Rugae Pattern and Tongue Prints among Karnataka, Kerala and Tamil Nadu Population – A Short Study

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Abstract:-

- ***Aim***

1. To compare the lip print, rugae pattern, & tongue print among three different population groups. 2. To study the predominant type of lip, rugae and tongue patterns in individual group of population. 3. To evaluate the efficacy of three parameters in Sex determination & population sub typing.

- ***Materials and Method***

The study included 90 subjects 30 Karnataka, 30 Kerala and 30 Tamil nadu subjects. Each group consisted of 15 males & 15 females in the age group of 18 to 30 years. Each individuals lip prints, palatal rugae,& tongue prints were studied using classifications given by Tsuchihashi, Lysell and Stefanescu et al. respectively and the results obtained were stastically analysed using chi square test and the P value less than 0.05 were considered significant.

- ***Results***

Type 3 lip print was found to be the most predominant among males and Type 1 in females in all the three populations. The major rugae shape among males was wavy and in females it was straight in all the three population. The U- shaped tongue was predominant among males and V- shaped among females and the longitudinal grooves showed no significant difference among males and females and between the states.

- ***Conclusion***

In the present study, we have made an attempt to study the lip prints, rugae pattern and tongue prints among three different population groups of India. Further studies with larger sample size are needed to overcome the shortcomings of the study.

Keywords:- *Forensic Odontology, Chelioscopy, Palataloscopy, Tongue Prints.*

I. INTRODUCTION

Identification of an individual plays a supreme role in any crime investigation, mass disaster, and deceased cases. Forensic identification is a multidisciplinary approach in which the field of forensic odontology deals with the proper handling and examination of dental findings.[1]

Forensic Odontology is the branch of forensic science which deals with evidence from dental and oral structures. In which cheiloscopy, rugoscopy, and study of tongue prints are the ancillary methods of identification.[2]

"Cheiloscopy" is the study of lip print pattern. The importance of cheiloscopy is due to the fact that the lip prints are unique to an individual, they can be easily traced and they rarely undergo any changes resisting many afflictions. The potential of lip prints to determine sex has been well documented by different studies. Few studies have shown the predominance of a particular lip print in particular population making it an adjuvant tool for population subtyping.[3]

Rugoscopy is the study of palatal rugae pattern The prime importance of studying rugae patterns is that they are permanent, due to normal growth remaining in the same position throughout the entire life of a person they do not undergo any changes except in length,.[4] Several studies have shown that rugae patterns can be used as an additive tool for gender determination and in population identification.[5]

Tongue prints are the newly evolving tool in forensic odontology. The reason for implementing tongue prints as a forensic tool is that the characteristic features of the tongue exhibit remarkable difference in each individual even in identical twins and they are well protected from the environmental influences.[6] Few studies regarding tongue prints in biometric systems and as an adjuvant tool in sex and person identification has been carried out. In recent years it is believed to be the reliable proof in forensic identification.[7]

Hence, the aim of this study is to find out the predominant type of lip print, Rugae pattern and Tongue print among males and females in Karnataka, Kerala, and Tamil nadu population and to find out the efficacy of three parameters in sex determination & population sub typing.

The Aim and Objective of this prospective study is:

- To compare the lip print, rugae pattern, & tongue print among three different population groups.
- To study the predominant type of each pattern in individual group of population.
- To evaluate the efficacy of three parameters in Sex determination & population sub typing

II. MATERIALS AND METHODS

The study sample included a total of 90 students studying in A.J. Institute of Dental and Medical Sciences, Mangalore- Karnataka, Where the study population was divided into three groups based on their state of nativity. Each group comprising of 30 subjects 15 males and 15 females from Karnataka, Kerala and Tamil nadu subjects between the age group of 18 to 30 years. Informed verbal consent was taken from each of the students.

- *Exclusion Criteria*

- Students with braces and ulcers in the lips & tongue
- Students with abnormalities of lips, palate and tongue and
- With bony and soft tissue protuberances, deformity, trauma and active lesions, were excluded

- *Recording the lip Prints*

The materials used for recording the lip prints were bright maroon colored lipstick, transparent cellophane tape, white chart paper, magnifying lens, and scissors. (Fig 1)

Lips of the study subjects were cleaned, and then the lipstick was applied all over the lips. The impression of the lips was traced by applying a rectangular piece of cellophane tape over the lips of the subjects. Then the lip impression was transferred to the white chart paper and then visualized using the magnifying lens.(Fig 2)

- *Examination of the Lip Prints*

The lip prints were analysed using the classification proposed by Tsuchihashias

- Type 1: Clear-cut vertical grooves that run across the entire lips
- Type 1': Similar to Type 1, but do not cover the entire lip
- Type 2: Branched grooves
- Type 3: Intersected grooves
- Type 4: Reticular grooves
- Type 5: Grooves do not fall into any of the above categories

- *Recording the Rugae Pattern*

The materials used for recording the rugae patterns were Alginate impression material, Maxillary impression trays, Dental stone, Plaster of paris, Graphite pencil and Metal scale. (Fig 3)

Alginate impressions of the maxillary arch were made and casts were poured using dental stone. Plaster base was prepared for the casts and followed by tracing the rugae pattern using graphite pencil. (Fig 4)

- *Examining the Rugae Pattern*

The rugae patterns were assessed using the classification proposed by Thomas & Kotze

- Curved: Crescent shaped and curved gently
- Wavy: Slight curve at the origin or termination of curved rugae
- Straight: Run directly from their origin to termination

- *Recording the Tongue Prints*

Subjects were asked to protrude their tongue and the DSLR camera was used to capture the images of the tongue. The shape of the tongue was examined from the corner of the mouth to the tip of the tongue. The tongue shape and the longitudinal grooves were categorized using the classification proposed by Stefanescu et al

- *Examination of Tongue Prints*

- *Based on shape*
  - ✓ U shaped
  - ✓ V shaped

- *Based on the Grooves*
  - ✓ Superficial
  - ✓ Deep

III. STATISTICAL ANALYSIS

The observed data was entered in the MS excel worksheet and the Statistical analysis was done using Pearson's chi square test and the statistical software SPSS version 17. P value less than 0.05 was considered significant.

IV. RESULTS

- *Lip Prints*

We observed that all lip print pattern was unique and no two individuals had the same pattern. In Karnataka Type 2 lip print pattern was observed to be predominant followed by Type 3. In Kerala Type 3 was predominant followed by Type 2 and in Tamil nadu Type3 followed by Type 1. (Fig 7 & 8)

As a whole in all the three populations males demonstrated principally of Type 3 and majority of females showed Type 2. The stastical association of lip print patterns among the Karnataka, Kerala and Tamil nadu population revealed no significant difference.

➢ *Rugae Pattern*

By the above study we observed that the rugae pattern in each individuals were distinct. The predominant rugae pattern among males in all the three states were found to be wavy pattern followed by curved and in female's straight pattern was predominant. (Fig 9 & 10). The interstate stastical association was insignificant.

➢ *Tongue Prints*

We observed that the predominant tongue shape among males in all the three states was found to be U shape and in females was V shape. No significant difference was observed in the longitudinal grooves among males & females**.**

On correlating the lip prints, palatal rugae, and tongue prints by Pearsons Chi-square test showed no statistical significance.

Fig 1:- Materials used for Recording Lip Prints

Fig 2:- Recorded Lip Prints

Fig 3:- Materials used for Recording Rugae Pattern

Fig 4:- Recorded Rugae Pattern

Fig 5:- DSLR Camera used for Visualizing Tongue Prints

Fig 6:- Visualization of Tongue Shape & Longitudinal Grooves

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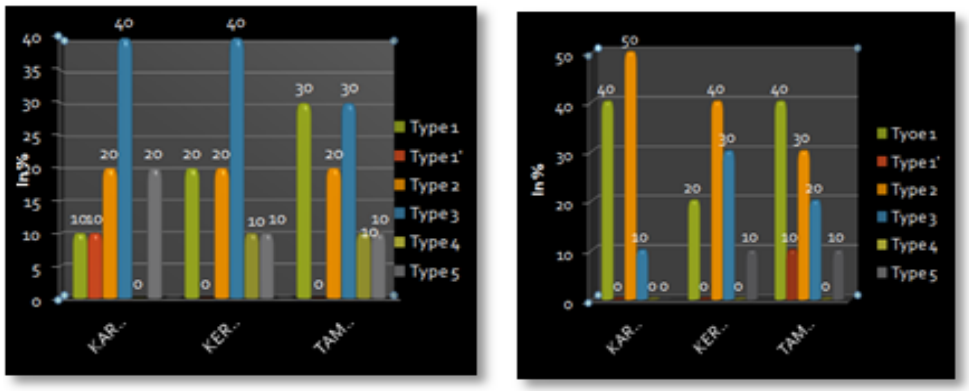

Fig 7 & 8:- Distribution of Lip Print Pattern among Males and Females in Karnataka, Kerala & Tamil Nadu Subjects

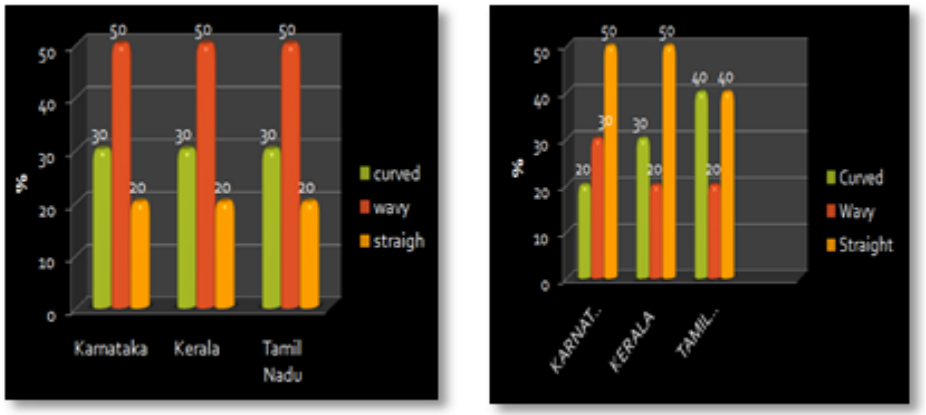

Fig 9 & 10:- Distribution of Rugae Pattern among Males and Females in Karnataka, Kerala & Tamil Nadu Subjects

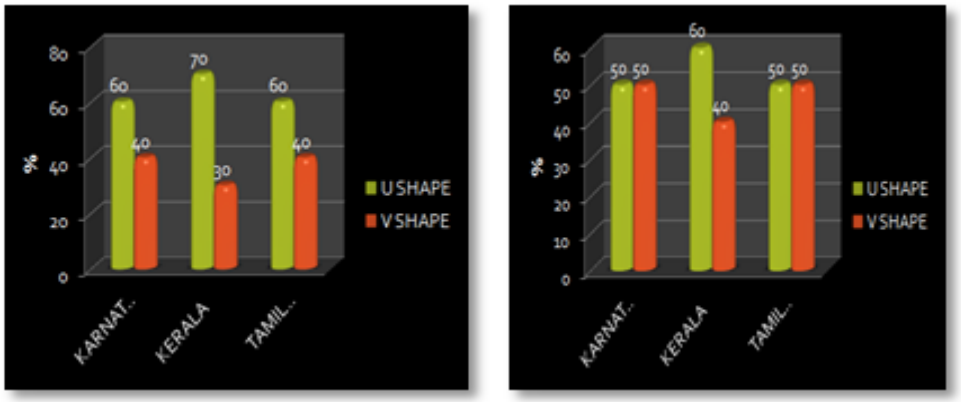

Fig 11 & 12:- Distribution of Tongue Shape among Males and Females in Karnataka, Kerala & Tamil Nadu Subjects

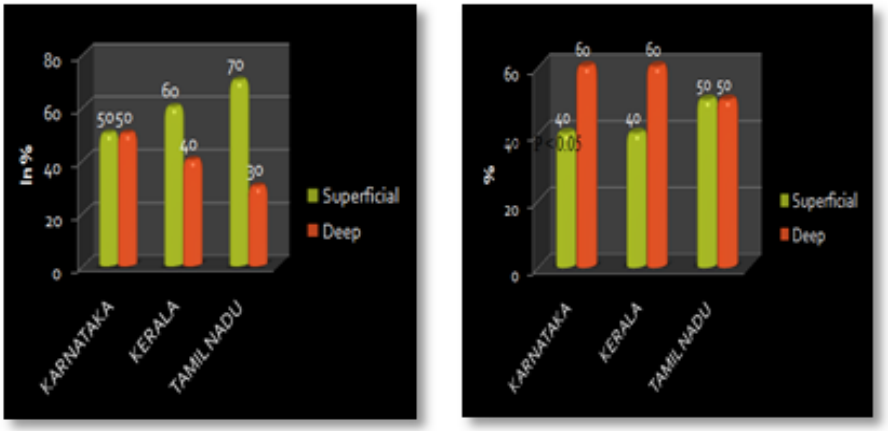

Fig 13 & 14:- Distribution of Tongue Grooves among Males and Females in Karnataka, Kerala & Tamil Nadu Subjects

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V. DISCUSSION

Mouth allows numerous possibilities that help in forensic identification. Dental and the supporting structures open numerous ways for the positive identification of victims from disasters, crime scenes and deceased persons.[8] The uniqueness of these structures makes them the potential parameters for forensic identification the dental records and Dna profiling plays a major role. Compilation of data from other parameters noticeably cheiloscopy, rugoscopy and recently tongue prints are also capable of playing a major role in criminal investigations where they serve as adjuvant in person identification, sex determination and population sub typing. [9, 10]

The importance of cheiloscopy is linked to the information that they develop at 6th month of intra uterine life, they are permanent and unique which are unchangeable after death. Palatal rugae pattern are stable, resistant to fracture and are believed to be precise for racial groups facilitation and the population recognition.[11] Tongue prints are found to be as unique as finger prints; moreover they are well protected from the external environment which proves them to be useful in forensic identification when used in conjunction with cheiloscopy and rugoscopy.[12]

In the literature, a number of studies have been done elaborately on lip prints, palatal rugae and few on tongue prints for sex and population identification individually. There are no studies that compared lip print, palatal rugae and tongue prints between three populations.

Hence, in the present study an attempt has been made to compare the lip prints, rugae patterns and tongue prints in subjects from three different parts of India (Karnataka, Kerala and Tamil nadu).

In the present study, the predominant lip print pattern among males was found to be Type 3 and in females it was Type 2. These results were in accordance to Hunasgi et al and Govindkar et al. Among the Karnataka population Type 2 was found to be predominant followed by Type 3. This was in accordance to Hunasgi et al and in contrast to the study done by Verghese et al who has found Type 4 as the predominant pattern among subjects from south Karnataka. [13]Among the kerala subjects Type 3 was predominant followed by Type 2. This was in contrast to Hunsagi et al who has reported Type 2 to be the principle pattern in kerala population. [14] Among the Tamil nadu subjects the predominant pattern was Type 3 followed by Type 1 this finding was in accordance with Sivapadhasundaram and Saraswathi et al.[15]In our study statistical association of all lip print patterns among Karnataka, Kerala and Tamil nadu population revealed no significant difference.

The predominant rugae pattern among males in all the three states were found to be wavy pattern followed by curved and in females straight pattern was predominant. These results were in accordance with Hunsagi et al. [14] No significant difference was observed between the states.

The principle tongue shape among males in all the three states was found to be U shape and in females was V shape. This finding was in accordance with Jeddy et al[.16] There was no significant difference in the longitudinal grooves and interstate comparison among the study subjects

VI. CONCLUSION

In our study we have made an attempt to compare lip prints. rugae pattern, and tongue prints among three population groups in India. Subtle difference in different studies may be attributed to smaller sample size.Further studies with larger sample size are needed which will definitely prove that the “Lip speak the untold, Rugae see the unseen, Tongue unleash the truth”.

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